6/20/91

ECOLOGICAL EFFECTS BRANCH REVIEW

Vinclozolin (Ronilan 50DF)

100 Submission Purpose and Label Information

100.1 Submission Purpose and Pesticide Use

The Department of Agriculture, Bureau of Plant Industry of the State of Pennsylvania requests an emergency exemption (Section 18) for the use on BASF Wyandotte Corporation's Vinclozolin fungicide, trade name Ronilan 50DF, to control Botrytis gray mold and Sclerotinia white mold on snap beans in the 1991 growing season.

100.2 Formulation Information

Active Ingredient:
Vinclozolin [3-(3,5-dichlorophenyl)-5-methyl-2,4-oxazolidinedione 50%

Inert Ingredients: 50%

100.3 Application Methods, Directions and Rates

A maximum of two applications would be made per season at a rate of 1 to 1.5 pounds of Ronilan 50DF per acre (0.5 to 0.75 pounds of active ingredient per acre). It is estimated that the State of Pennsylvania will only use Ronilan on 3000 acres, the maximum being 6000. Thus, a maximum of 9000 pounds of product or 4500 pounds of active ingredient would be applied in 1991. Ronilan 50DF is to be applied aerially or with airblast equipment from an enclosed tractor cab or an applicator wearing protective gear (method is not specified in the document for snap beans).

> Application: For aerial equipment Ronilan should be made in not less than 20 gallons of spray solution per acre (for strawberries). By ground equipment Ronilan should be made in not less than 100 gallons of spray solution per acre (for strawberries).

The first application of Ronilan 50DF should be no later than 10% primary bloom (for strawberries). If the conditions are favorable for high disease occurrence (frequent natural moisture e.g., rain, fog, or dew or when using sprinkler irrigation) then a second application should be applied 7 to 9 days after the first application.

100.4 **Target Organisms**

Sclerotinia white mold (Sclerotinia sclerotiorum)

Botrytis gray mold (Botrytis cinerea)

100.5 **Precautionary Labeling**

Environmental Hazards (from product label)

Do not apply directly to water. Do not contaminate water when disposing of equipment washwaters. Product is toxic to fish.

101 **Hazard Assessment**

101.1 **Discussion**

The State of Pennsylvania is requesting an emergency exemption to use the fungicide Ronilan 50DF to control Sclerotinia white mold and Botrytis gray mold on its snap bean crop. Both Botrytis gray mold and Sclerotinia white mold can infect leaves, stems, and pods of snap beans, but are only serious after blossoms have been initiated. Ronilan is needed when extended periods of cool (65-75°) wet weather (dew, light rains, and high humidity) occur.

In 1989, according to Pennsylvania Agriculture Statistics Service, 6000 acres of snap beans were contracted for harvest in Pennsylvania. However, in 1991 it is estimated that only 3000 acres will need to be treated with Ronilan 50DF in Pennsylvania. This would include 40 growers in the following counties: Centre, Colombia, Lycoming, Union, and York.

A maximum of two applications would be made per season at a rate of 1 to 1.5 pounds of Ronilan 50DF per acre (0.5 to 0.75 pounds of active ingredient per acre). Thus, a maximum of 9000 pounds of product or 4500 pounds of active ingredient would be applied in 1991.

Ronilan 50DF is currently registered for application on strawberries, lettuce (all types), stonefruit, raspberries, and onions (dry bulb type).

According to the letter (Dr. J.E. Hunter, Cornell University) enclosed in the proposal package from the Pennsylvania Department of Agriculture, section 18's have been approved for the use of Ronilan on snap beans for seven years.

101.2 **Likelihood of Adverse Effects on Nontarget Organisms**

Terrestrial Organism Toxicity

Studies performed on the acute and subacute toxicity of technical vinclozolin indicate that it is practically nontoxic to birds. The avian acute oral LD_{50} for bobwhite quail is reported to be > 2,510 mg/kg. Avian Dietary LC_{50} studies are reported to be > 5620 ppm for bobwhite quail and > 5629 ppm for mallard duck.

The results from the acute toxicity studies on rats indicate that vinclozolin has a low toxicity for small mammals. Acute Oral LD_{50} of > 10 g/kg and > 13 g/kg are reported.

The results from the Honey Bees Acute Contact LD_{50} study indicates that vinclozolin is practically nontoxic to honey bees, LD_{50} > 100 ug/bee.

A major concern for terrestrial organisms is the adverse effects vinclozolin has on avian reproduction. This chemical may effect egg production and egg fertility at dietary concentrations of 5 ppm (EEB review, J. Tice, 1982). The Canadian Wildlife Service has found evidence that vinclozolin affects avian testicular development (Memo from R. Balcomb 1984). Officials have recommended, on the basis of available reproduction data, that the chemical not be registered in Canada.

In 1988 the BASF Wyandotte Corporation submitted a study on Avian Reproduction with Mallard Duck (Anas platyrhynchos) - Special Test for Male Fertility. The study indicated no reduction in male fertility at concentration levels of vinclozolin from 2.5 - 50 ppm. However, the study did not fulfill guideline requirements for this kind of study, therefore is not considered scientifically sound.

Aquatic

Studies performed on the acute toxicity of technical vinclozolin indicate that it is moderately toxic to freshwater fish. The 96-hour acute toxicity test LC_{50} for bluegill sunfish is reported to be > 3.4 ppm and > 2.84 for rainbow trout. The rainbow trout study, however did not fulfill the guidelines for the 96 hour acute toxicity test as the water temperature was too high.

The LC_{50} value for Daphnia magna was determined to be

3.65 mg/l, indicating moderate toxicity. This study fulfills the guideline requirements for aquatic invertebrates.

Plant Toxicity

To date there has been no toxicity studies performed on terrestrial or aquatic plants. The guidelines require three tests when the chemical in question is a fungicide: seed germination/seedling emergence, vegetative vigor, and an aquatic plant growth study on Selenestrum capricornutum.

Exposure Assessment

Terrestrial

According to Gusey and Maturgo (1973), in Pennsylvania white-tailed deer, cottontail rabbits, and songbirds use snap bean fields for feeding and cover (only songbirds).

At a maximum rate of 0.75 lb a.i./A the following maximum residue levels would be expected immediately after application.

Substrate	Upper limit residue (ppm)
Short range grass	180.00
Long grass	82.50
Leaves & leafy crops	93.75
Forage (alfalfa & clover)	43.50
Pod containing seeds	9.00
Fruit	7.50
Grain	5.25

Acute hazards to nontarget terrestrial organisms are not expected from the proposed exemption use since the estimated environmental concentrations (EEC) are less than 1/5 LC_{50} for mallard (1/5 LC_{50} = 1125.8 ppm) and bobwhite quail (1/5 LC_{50} = 1124 ppm). Adverse effects to endangered terrestrial organisms are not expected because the EEC is less than 1/10 LC_{50} for mallard (1/10 LC_{50} = 562.9 ppm), bobwhite quail (1/10 LC_{50} = 562.0 ppm), and rats (1/10 LD_{50} = 1000 ppm).

These residue levels, however, far exceed the reproductive effect level (5 ppm) for avian species.

The use period under the proposed registration may encompass the breeding season for several species of birds in Pennsylvania.

Aquatic

Exposure Scenario	Concentration of vinclozolin (ppm)
Direct application (6 in. depth)	0.550
Spray drift (20% into 6 in. depth)	0.110
Runoff (1% into 1 ac. pond, 6 ft. avg. depth)	0.005

Acute hazards to nontarget aquatic species are considered minimal since the worst case EEC (direct application) is less than 1/2 LC_{50} values for rainbow trout (LC_{50} > 2.84 ppm), bluegill sunfish (LC_{50} > 3.4 ppm), and daphnia (LC_{50} = 3.65 ppm). Indirect exposure through drift and runoff is expected to result in exposure concentrations below 1/10 of the reportyed LC50 values. Chronic hazards to nontarget aquatic organisms are not expected as the probability of exposure is low and the acreage to be treated is limited.

Plant

Acute hazards to nontarget plants can not be assessed due to lack of data.

101.3 **Endangered Species**

There are three federally endangered species in the counties of Pennsylvania where the application of vinclozolin may be applied:

County	Endangered Species
Centre	Indiana bat (Myotis sodalis) Small whorled pogonia (Isotria medeoloides)
Colombia	Indiana bat
Lycoming	Indiana bat
Union	Indiana bat
York	Indiana bat Bald eagle (Haliaeetus leucocephalus)

At this point, EEB cannot sufficiently assess the hazards of vinclozolin to these species because

adequate data concerning avian reproduction and plant toxicity are not available.

101.4 **Adequacy of Toxicity Data**

The existing database is not adequate to assess hazards to all nontargets under the proposed exemption. In order to assess the hazard of vinclozolin to avian species and aquatic organisms, EEB requires the following data: a freshwater fish 96-hour acute toxicity study on rainbow trout, an avian reproduction study as discussed above, and pending the results, a monitoring study of residues on avian food items may also be required. In addition, the acute and/or chronic hazards to nontarget plants cannot be assessed until the required three tests for fungicides (seed germination/seedling emergence, vegetative vigor, and an aquatic plant growth study on Selenestrum capricornutum) are submitted.

101.5 **Adequacy of Labeling**

The following environmental hazard labeling should be required: "This product is toxic to birds and fish. Do not apply directly to water, or to areas where surface water is present or to intertidal areas below the mean high-water mark. Drift and runoff may be hazardous to aquatic organisms in neighboring areas. Do not contaminate water when disposing of equipment washwater or rinsate."

103 **Conclusions**

EEB has reviewed the proposed emergency exemptions for the use of Ronilan (vinclozolin) on snap beans. EEB concludes that the proposed use of vinclozolin (Ronilan) may have negative effects on avian egg production, egg fertility, and on male testicular development as reported in the study reviewed by Tice (1982). In addition, it may have acute and/or chronic effects on nontarget plants and fish. Therefore, in order to assess the potential risks associated with vinclozolin on nontarget wildlife and plants, EEB requires the following data:

1) A 96-hour freshwater fish acute toxicity study on rainbow trout.

2) An avian reproduction study.

3) Pending the results of the avian reproduction

study, a residue monitoring study on avian food items may also be required.

4) Three plant studies for fungicides (seed germination/seedling emergence, vegetative vigor, and an aquatic plant growth study on Selenestrum capricornutum).

Citations

Gusey, W.F. and Z.D. Maturgo. 1973. Wildlife utilization of croplands. Environmental Affairs Shell Oil Company, Houston, Texas. pp. 278.

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